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"Nec aranearum sane textus ideo melior quia ex se fila gignunt, nec noster vilior quia ex alienis libamus ut apes." Just. Lips. *Polit.* lib. i. cap. 1. Not.

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triangle ABC is a semidiameter of the ellipsoid, drawn in the direction of the axis of one of the two circumscribed cylinders of revolution; a property which was mentioned in the 32nd article, and which may be seen to hold good, not only from the recent analysis conducted by the Cartesian method, but also and more simply from the geometrical consideration that the constant rectangle under the two straight lines BD and AE, in the construction, exceeds the double area of the triangle ABE, and therefore exceeds the rectangle under the fixed line AB and the perpendicular let fall thereon from the variable point E of the ellipsoid, except at the limit where the angle ADB is right; which last condition determines a circular locus for D, and an elliptic locus for E, namely that ellipse of contact along which a cylinder of revolution round AB envelopes the ellipsoid, and which here presents itself as a section of the cylinder by a plane. The radius of this cylinder is equal to the line BG, if G be the point of intersection, distinct from A, of the side AB of the generating triangle with the surface of the diacentric sphere; which line BG is also easily shown, on similar geometrical principles, as a consequence of the same construction, to be equal to the common radius of the two circular sections, or to the mean semiaxis of the ellipsoid, which is perpendicular to the greatest and the least. Hence also the side AB of the generating triangle is, in length, a fourth proportional to the three semiaxes, that is to the mean, the least, and the greatest, or to the mean, the greatest, and the least, of the three principal and rectangular semidiameters of the ellipsoid.

[To be continued.]

XXXVII. *Notices respecting New Books.*

Notice of a Memoir on Meteors of various sorts. By T. I. M. Forster, *F.R.A.S., &c.* Bruges, 1846.

EXPERIENCED in observing and in treating of these phænomena, Dr. Forster refers his readers to his former communications of them, and to the numerous articles in the Royal Society's Transactions, as well as in the Gentleman's and Philosophical Magazines.

He carefully examines the theory of phosphorescent jets of gas rising unperceived while traversing the low and *damp* strata of the atmosphere, but becoming ignited as soon as they reach a sufficiently *dry* stratum. The ignition is then supposed to run down the column of gas, and reveal the several bends it had been subjected to by various currents of wind. The occasional explosions may be explained by supposing the running fire to reach a spot overabounding in hydrogen, instances not unfrequent after heavy rains.

It was not till the 10th of August 1811 that the idea of their periodicity occurred to Dr. Forster, when he and his father counted some hundreds, and by their journal perceived their recurrence on that same day. Indeed, in copying a curious old manuscript calendar, he found the 10th and 18th of August called *stellibundæ* and *meterodes*; but he acknowledges their frequency at all times and in all places.

Inclined to assign them a gaseous origin, our author has yet, in deference to the learned men who differed from him, endeavoured to relate fairly the various arguments in favour of their several theories.

Aristotle regarded meteors as arising from exhalations denoting an approaching change of weather. *Theophrastus* thought they prognosticated wind from the quarter towards which they rushed. And *Aratus* agreed with him, especially if they left long lingering tails, in which he was imitated by *Virgil*. *Lucan* in his Pharsalia rather confounds meteors with the fixed stars. *Homer* compares the descent of Minerva to the rush of a meteor.

Passing over the middle ages, when meteors were feared as indications of Divine anger, we find that in the seventeenth century electricity began to be suspected, and was supported by the highest names of that æra. Then the magnificent meteor of the 18th of August 1783 brought out the elaborate paper by Dr. Blagden in the Philosophical Transactions for the following year. As to their velocity, it varies so much that this element cannot suffice to decide from what height they fall. The meteor above alluded to moved at only six miles per second when at about ninety miles above our heads. Cavallo estimated its diameter at 3200 feet, and its elevation at 560 miles. Certainly the explosion not being heard for ten minutes after it was seen is a sufficient proof of its distance. The general electric state of the atmosphere that year over half the globe is well known, by the remarks made in consequence of the violent earthquakes that occurred.

In support of the theory that meteors are occasioned by the ignition of columns of inflammable gas, Dr. Forster mentions the *ignis fatuus*, and the flitting lights that are seen in May on cabbages. Many naturalists regard meteors as one of the various phænomena attributable to electricity, and some expected to find that they chiefly pointed to the magnetic pole.

Many roofs of thatch have been ignited by the fall of meteors upon them, and this must be the explanation of towns recorded to have been burnt by fire from heaven. The explosion of the meteor of the 25th of September 1846, was heard *a few* seconds after it was seen: but if, instead of the ambiguous term *a few*, spectators would count slowly, they would afford a much nearer approach to the true time elapsed, especially if they would afterwards count at the same rate when they can compare with a seconds watch, or with a clock. (A.S.) The tail of that meteor was larger than usual, and lasted longer, some persons stating fifty seconds, others some minutes. More precise details are requisite. It was at first whitish, then purplish, and lastly red, when it became curved, and faded in a serpentine form. This last phænomenon was observed in another instance about twenty years since. Even the luminous arc of the 28th of September 1828 might, our author thinks, be a still more dilatory tail of a meteor that had shot across our hemisphere just before sunset, and for that reason was not perceived. In July 1799 Dr. Forster's father saw a meteor cross the sky from south to north, then return southward, and finally bend to the north-west. Another peculiarity is that of rising in the sky instead of descending, which has been reported as occurring sometimes near the equator, where they are very numerous. And Dr. Forster himself saw a whitish globe stationary for two seconds, and then turn a fine red.

A shower of small meteors is recorded to have occurred on the 25th of April 1095; and Dr. Forster saw an approximation to this on a bright winter night in 1832, inasmuch as the whole firmament was in a glow from an immense number of very fine luminous tails nearly parallel from E.N.E. to W.S.W. They might deserve the name rather of streaks, no heads being visible. The duration of each might not exceed a second, but the phænomenon altogether lasted a quarter of an hour and then ceased suddenly. And in November 1830 he saw a similar multiplicity of little streaks, but crossed by others at right angles. Another peculiarity was described by a clergyman near Epping, that of seeing a meteor, after descending to the earth, undergo a sort of reverberation by rising in an oblique direction, and then break into sparks.

Among the numerous authors who have treated of this subject, perhaps M. Quetelet's catalogue is the most complete, with the exception of his omitting the interesting meteor of 1783. M. Arago and M. Biot have also treated the subject ably.

A copious journal of meteors has been kept in Dr. Forster's family from 1767, but no periodicity was suspected till the 10th of August 1811; though then, on looking back through the journal, it was perceived that there had been a great preponderance in the Novembers ever since 1799, and in the Augusts from 1779. When employed a few years after to construct perennial calendars, Dr. Forster indicated a number of meteors as a phænomenon to be expected on the 10th of August.

This became confirmed in 1831 by other observers, and they added the second period of the 13th of November. M. Quetelet now adds April and December, while others suggest January, May, June and July. He thinks their usual height in the atmosphere is from sixteen to twenty leagues or more, though they are occasionally seen slanting very near the ground. The most numerous sort, distinguished by the name of *étoiles filantes*, may revolve in trajectories by swarms, forming a belt round the sun, which we have occasionally to traverse. Then, owing to the earth's motion, these luminous corpuscles would naturally, as they have been observed to do, appear to "have their point of divergence towards β Camelop. in August, and towards v Leonis in November, agreeing with our annual motion in the ecliptic." According to the known laws of optics, the swarm would seem to separate in radii as we neared them, and, owing to the compound velocities, seem to tend from N.E. to S.W.

Although meteors differ very much from each other in some instances, it is very difficult to classify them; but an abundance of them seems connected with a change of weather, and especially with cirrostratus and cirrocumulus clouds. As to their direction, though they sometimes converge towards one point, they rush at others towards every point of the compass. He therefore wavers only between an electric and a gaseous origin,—quoting electric experiments referred to in England by the Abbé Bertholon, and gaseous ones by Constable, as having produced excellent imitations.

In the terrible night of the 7th of July 1834, a crowd of nimbi collected around Vesuvius about 9 o'clock, shooting their lightnings down towards the mountain accompanied by rain and hail. The lightning was sometimes bluish and sometimes reddish.

As to the periodicity of meteors, Dr. Forster finds that there are decided changes in the electrometers also on the 10th of August and 13th of November; and the greatest number he ever saw fell on the 10th of August 1811, just after a violent storm; but when a storm has happened some time before, the meteors are fewer at the two periods observed. Also if one or more large meteors occur, there are no small ones afterwards for a proportionate time, as if the atmosphere had been cleared of the requisite material. Also it may be remarked in general, that the winter and the higher latitudes are least prolific of them.

Fiery balls do not often occur, but are very powerful. Thus the one seen in France and in England the 17th of July 1771, must have been at an elevation of fifty-four miles, and the report of its explosion was not heard till two minutes after its occurrence, like the rolling of thunder; but the observatory windows at Paris were "*ébranlées.*" It appeared larger and brighter than the ☽, and its swiftness was estimated at twenty-four miles per second.

From the quickly-increasing rarity of our atmosphere, Arbuthnot thinks that at the height of sixty miles (the estimated height of the meteor in 1718) the air is 30,000 times purer than on the level of the sea. Yet Pringle estimated the height of the meteor of 1738 to have been ninety miles. The diameter of some globes has been estimated at 1½ mile.

XXXVIII. *Proceedings of Learned Societies.*

ROYAL SOCIETY.

[Continued from p. 77.]

June 17, 1847.—"RESEARCHES on the Function of the Intercostal Muscles and on the Respiratory Movements, with some remarks on Muscular Power, in Man." By John Hutchinson, M.R.C.S. Communicated by Sir Benjamin Brodie, Bart., F.R.S., &c.

The object of this paper is to demonstrate by models and dissections the action of the intercostal muscles.